

## Claims

1. A honeycomb catalyst carrier comprising:

a honeycomb formed cell structure composed of a porous material having a large number of pores, the cell structure having cells each functioning as a fluid passage; and

an outer wall composed of a porous material disposed so as to cover an outer periphery of the cell structure,

wherein an impregnated part is formed in an outermost peripheral part, which has a given thickness, of the porous material of the cell structure, the impregnated part being impregnated with a water-insoluble organic material which disappears by burning or an inorganic material.

2. The honeycomb catalyst carrier according to claim 1, wherein a permeability (k) of the impregnated part defined by the following equation (1) is lower than that of the other part of the porous material of the cell structure.

$$k = (\mu \cdot L/A)(\Delta Q/\Delta P) \quad (1)$$

k: permeability ( $\mu\text{m}^2$ )

$\mu$ : viscosity coefficient of air at 20 deg.C ( $\mu\text{Pa}\cdot\text{sec}$ )

L: thickness of sample (mm)

A: air-permeating area of sample ( $\text{cm}^2$ )

$\Delta Q/\Delta P$ : gradient of "discharge air flow rate / compressed air pressure"  
 ((cc/sec)/psi)

3. A honeycomb catalyst carrier comprising:

a honeycomb formed cell structure composed of a porous material having a large number of pores, the cell structure having cells each functioning as a fluid passage; and

an outer wall composed of a porous material disposed so as to cover an

outer periphery of the cell structure,

wherein an intermediate layer of an inorganic material is formed between an outer periphery of the cell structure and an inner surface of the outer wall.

4. The honeycomb catalyst carrier according to claim 3, wherein a permeability(k) of the intermediate layer defined by the following equation (1) is lower than that of the porous material of the cell structure.

$$k = (\mu \cdot L/A)(\Delta Q/\Delta P) \quad (1)$$

10 k: permeability ( $\mu\text{m}^2$ )

$\mu$ : viscosity coefficient of air at 20 deg.C ( $\mu\text{Pa} \cdot \text{sec}$ )

L: thickness of sample (mm)

A: air-permeating area of sample ( $\text{cm}^2$ )

$\Delta Q/\Delta P$ : gradient of "discharge air flow rate / compressed air pressure"

15 ((cc/sec)/psi)

5. The honeycomb catalyst carrier according to any one of claims 1 to 4, wherein the permeability(k) of the impregnated part or the intermediate layer is  $0.7 \mu\text{m}^2$  or less.

6. A honeycomb catalyst carrier comprising:

20 a honeycomb formed cell structure composed of a porous material having a large number of pores, the cell structure having cells each functioning as a fluid passage;

and an outer wall composed of a porous material disposed so as to cover an outer periphery of the cell structure,

25 wherein an impregnated part is formed in an outermost peripheral part, which has a given thickness, of the porous material of the outer wall, the impregnated part being impregnated with a water-insoluble organic material which disappears by burning or an inorganic material.

7. The honeycomb catalyst carrier according to claim 6, wherein a permeability (k) of the impregnated part defined by the following equation (1) is lower than that of the other part of the porous material of the outer wall.

$$5 \quad k = (\mu \cdot L/A)(\Delta Q/\Delta P) \quad (1)$$

k: permeability ( $\mu\text{m}^2$ )

$\mu$ : viscosity coefficient of air at 20 deg.C ( $\mu\text{Pa}\cdot\text{sec}$ )

L: thickness of sample (mm)

10 A: air-permeating area of sample ( $\text{cm}^2$ )

$\Delta Q/\Delta P$ : gradient of "discharge air flow rate / compressed air pressure"  
((cc/sec)/psi)

8. A honeycomb catalyst carrier comprising:

15 a honeycomb formed cell structure composed of a porous material having a large number of pores, the cell structure having cells each functioning as a fluid passage; and

an outer wall composed of a porous material disposed so as to cover an outer periphery of the cell structure,

20 wherein the whole porous material of the outer wall is an impregnated part impregnated with a water-insoluble organic material which disappears by burning or an inorganic material.

9. A honeycomb catalyst carrier comprising:

25 a honeycomb formed cell structure composed of a porous material having a large number of pores, the cell structure having cells each functioning as a fluid passage; and

an outer wall composed of a porous material disposed so as to cover an outer periphery of the cell structure,

wherein a coat layer is formed so as to cover an outer periphery of the

outer wall, the coat layer comprising a water-insoluble organic material which disappears by burning or an inorganic material.

10. The honeycomb catalyst carrier according to claim 9, wherein a permeability(k) of the coat layer defined by the following equation (1) is lower  
5 than that of the porous material of the outer wall.

$$k = (\mu \cdot L/A)(\Delta Q/\Delta P) \quad (1)$$

k: permeability ( $\mu\text{m}^2$ )

10  $\mu$ : viscosity coefficient of air at 20 deg.C ( $\mu\text{Pa}\cdot\text{sec}$ )

L: thickness of sample (mm)

A: air-permeating area of sample ( $\text{cm}^2$ )

$\Delta Q/\Delta P$ : gradient of "discharge air flow rate / compressed air pressure"  
((cc/sec)/psi)

- 15 11. The honeycomb catalyst carrier according to any one of claims 6 to 10, wherein the permeability(k) of the outer wall having the impregnated part, of the whole porous material of the outer wall or of the outer wall having the coat layer is  $0.04 \mu\text{m}^2$  or less.
12. The honeycomb catalyst carrier according to any one of claims 1, 2, 5 to  
20 8, and 11, wherein the organic material is a petroleum hydrocarbon oil, a silicone oil, a thermoplastic resin, a thermosetting resin, a wax or a mixture thereof.
13. The honeycomb catalyst carrier according to any one of claims 1, 2, and 5 to 11, wherein the inorganic material is a ceramic sol, an alkylsilane compound or a mixture thereof.
- 25 14. The honeycomb catalyst carrier according to any one of claims 3 to 5, and 9 to 11, wherein the inorganic material is one or more of ceramics.
15. The honeycomb catalyst carrier according to any one of claims 9 to 11, wherein the organic material is a thermoplastic resin, a thermosetting resin, a

wax, or a natural or synthetic rubber.

16. A method for production of a honeycomb catalyst carrier having a honeycomb formed cell structure composed of a porous material having a large number of pores, the cell structure having cells each functioning as a fluid

5 passage,

wherein the method comprises impregnating:

a water-insoluble organic material which disappears by burning or an inorganic material into an outermost peripheral part, which has a given thickness, of the porous material of the cell structure to form an impregnated part; and then

10 disposing an outer wall composed of a porous material so as to cover an outer periphery of the cell structure.

17. A method for production of a honeycomb catalyst carrier having a honeycomb formed cell structure composed of a porous material having a large number of pores, the cell structure having cells each functioning as a fluid

15 passage,

wherein the method comprises:

applying an inorganic material to an outer periphery of the cell structure to form an intermediate layer; and then

20 disposing an outer wall composed of a porous material so as to cover the intermediate layer.

18. A method for production of a honeycomb catalyst carrier having a honeycomb formed cell structure composed of a porous material having a large number of pores, the cell structure having cells each functioning as a fluid passage,

25 wherein the method comprises:

disposing an outer wall composed of a porous material so as to cover an outer periphery of the cell structure; and then

impregnating a water-insoluble organic material which disappears by

burning or an inorganic material into an outermost peripheral part, which has a given thickness, of the porous material of the outer wall to form an impregnated part.

19. A method for production of a honeycomb catalyst carrier having a  
5 honeycomb formed cell structure composed of a porous material having a large number of pores, the cell structure having cells each functioning as a fluid passage,

wherein the method comprises:

- 10 disposing an outer wall composed of a porous material so as to cover an outer periphery of the cell structure; and then

impregnating a water-insoluble organic material which disappears by burning or an inorganic material into the whole porous material of the outer wall to form an impregnated part.

20. A method for production of a honeycomb catalyst carrier having a  
15 honeycomb formed cell structure composed of a porous material having a large number of pores, the cell structure having cells each functioning as a fluid passage,

wherein the method comprises:

- 20 disposing an outer wall composed of a porous material so as to cover an outer periphery of the cell structure; and then

applying a water-insoluble organic material which disappears by burning or an inorganic material so as to cover an outer periphery of the outer wall to form a coat layer.